IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please AMEND claims 1 and 14 in accordance with the following:

1. (CURRENTLY AMENDED) An airgap type etalon comprising:

a fixing member having at least one flat surface;

a first parallel member, which is transparent to incident light and has parallel flat surfaces, one of said parallel flat surfaces thereof being joined to said flat surface of said fixing member;

at least one second parallel member, which has parallel flat surfaces in which a distance between said parallel flat surfaces thereof is greater than a distance between said parallel flat surfaces of said first parallel member, and has an expansion coefficient different from that of said first parallel member, one of the flat surfaces of said second parallel member being joined to said flat surface of said fixing member so as to surround the outer periphery of said first parallel member; and

a transparent member, which is transparent to incident light and has opposite flat surfaces, one of said flat surfaces thereof being joined to the other flat surface of said second parallel member, said other flat surface being opposite to the joined surface to said fixing member;

wherein a Fabry-Perot interferometer is formed based on an airgap positioned between the flat surface of said first parallel member and the flat surface of said transparent member facing each other, and wherein a distance between the parallel flat surfaces and the expansion coefficient of each of said first and second parallel members, are set based on a variation of an air refractive index in the airgap due to a temperature fluctuation, so that when a temperature rises, a distance between the surfaces of said first parallel member and said transparent member that face each other, is set to be longer than an initial value before the temperature rises, to enable the compensation of ~~to obtain temperature dependency of a transmission wavelength characteristic which is greater than a predetermined value, so that a~~ wavelength temperature dependency of a wavelength characteristic of incident light ~~is capable~~

~~of being compensated~~.

2. (ORIGINAL) An airgap type etalon of claim 1, wherein

said fixing member has a through-hole for passing light therethrough,

said first parallel member is formed with an antireflection coating on one flat surface thereof, and this flat surface formed with said antireflection coating is joined to said flat surface of said fixing member around said through-hole, and

said transparent member is formed with an antireflection coating on the other flat surface thereof opposite to the joined surface to said second parallel member.

3. (ORIGINAL) An airgap type etalon of claim 1, wherein

said fixing member is transparent to incident light, and is formed with an antireflection coating on a surface opposite to said flat surface thereof, and

said transparent member is formed with an antireflection coating on the other flat surface thereof opposite to the joined surface to said second parallel member.

4. (ORIGINAL) An airgap type etalon of claim 1, wherein reflection augmenting coatings are formed on said flat surfaces of said first parallel member and said transparent member facing each other, respectively.

5. (CANCELLED)

6. (CANCELLED)

7. (PREVIOUSLY AMENDED) An airgap type etalon of claim 1, wherein temperature dependency of said transmission wavelength characteristic is set to be 25pm/ °C or more.

8. (CANCELLED)

9. (CANCELLED)

10. (CANCELLED)

11. (CANCELLED)

12. (CANCELLED)

13. (CANCELLED)

14. (CURRENTLY AMENDED) An airgap type etalon comprising:

a fixing member having a surface;

a first parallel member which is transparent to incident light and has parallel surfaces and an expansion coefficient, one of said parallel surfaces being coupled to the surface of said fixing member;

a second parallel member having parallel first and second surfaces which are spaced apart by a distance which is greater than a distance between the surfaces of said first parallel member, said second parallel member having an expansion coefficient, the first surface of said second parallel member being coupled to the surface of said fixing member; and

a transparent member having a surface coupled to the second surface of said second parallel member, so that an airgap is formed between said first parallel member and said transparent member

the distance between the parallel surfaces and the expansion coefficient of each of said first and second parallel members being set based on a variation of an air refractive index in the airgap due to a temperature fluctuation, so that when a temperature rises, a distance between the surfaces of said first parallel member and said transparent member that face each other, is set to be longer than an initial value before the temperature rises, to enable compensation for ~~so as to produce an increased temperature dependency of a transmission wavelength characteristic which is greater than a predetermined value, so that~~ a wavelength temperature dependency of a wavelength characteristic of incident light ~~to said airgap type etalon is capable of being compensated~~.

REMARKS

In the final Office Action the Examiner noted that claims 1-4, 7 and 14 are pending in the application and the Examiner rejected all claims. By this Amendment, various claims have been amended. Thus, claims 1-4, 7 and 14 remain pending in the application. The Examiner's rejections are traversed below.

Advisory Action

In an Advisory Action mailed April 16, 2004 the Examiner noted that the proposed claim amendment submitted by the Rule 116 Amendment filed April 2, 2004 would not be entered because they raise new issues which require further search and consideration. In addition the Examiner stated that it was unclear whether the air that varies in refractive index is within the airgap or around the etalon. By this Amendment, the substance of the prior Rule 116 Amendment is being resubmitted. In addition, applicants have submitted additional amendments to claim 1 and 14 to clarify that it is the air in the airgap that varies in refractive index.

Rejection Under 35 U.S.C. § 112

In items 1-3 on page 2 of the Office Action the Examiner rejected claims 1 and 14 under 35 U.S.C. § 112 second paragraph, as indefinite. In particular, the Examiner took the position that the terms "greater than":, "greater" and "increased" are indefinite. By this Amendment, claims 1 and 14 have been amended to clarify the features of the present invention and to remove the objectionable terms. Therefore, it is submitted that claims 1 and 14, as amended, meet the requirements of 35 U.S.C. § 112.

Rejection of Claims 1, 3-4, 7 and 14

In items 4-24 on pages 3-8 of the Office Action the Examiner rejected claims 1, 3-4 and 14 under 35 U.S.C. § 103 as unpatentable over U.S. Patent 5,167,444 to Hall in view of the publication entitled "Temperature Independent Interferometer for WDM Filters" by Shirasaki.

U.S. Patent 5,167,444 to Hall

The Hall patent is directed to an apparatus and method for optical signal source stabilization. Figure 2 of Hall illustrates an interferometer 20 having three discs 36, 37 and 38 and a ring 40 formed of a material having a low coefficient of thermal expansion. The three discs 36, 37 and 38 as well as the ring 40 are formed of a glass ceramic composite material. The glass ceramic material includes a first component having a positive coefficient of thermal expansion and a second component having a negative coefficient of thermal expansion (column 4, lines 31-48).

Hall discloses stabilizing a frequency of an optical signal output from an optical signal source by polarizing the optical signal output from the optical signal source to direct the polarized optical signal to a Fabry-Perot interferometer, and controlling the optical signal source so that light selected after transmitting through the Fabry-Perot interferometer is maintained.

The Shirasaki Publication

The Shirasaki publication is directed to a method for eliminating the temperature dependence of an interferometer such as a Fabry-Perot etalon. Referring to Figure 3, Shirasaki discloses that temperature dependence of an optical distance is reduced by forming the interferometer such that a thin glass plate having anti-reflection coatings is sandwiched between thick glass plates having larger thermal expansion coefficients than the thin glass plate. The Shirasaki publication appears to be related to cited U.S. Patent 5,982,488 to Shirasaki.

The Present Claimed Invention Patentably Distinguishes over the Prior Art

By this Amendment claims 1 and 14 have been amended in order to clarify the features of the invention relating to increasing the temperature dependency of the transmission wavelength characteristic of the etalon, including reciting a feature regarding the distance between the reflecting surfaces of the etalon, and a feature regarding the variation of the refractive index of the air gap.

Referring to Shirasaki, and particularly Figure 4 of the Shirasaki '488 patent, members 202 and 203 having different expansion coefficients, are illustrated. When a refractive index changes due to a temperature fluctuation, a distance between reflecting surfaces is adjusted by

applying a tensile force on a member 201 between the reflecting surfaces 202 by the outer members 203. (See Figure attached as Exhibit A.) It is clear that the constitution of Shirasaki does not teach or suggest the features of the present invention relating to the claimed air gap type etalon of the present invention which compensates for variation in the air refractive index due to temperature fluctuation.

The Hall reference merely discloses that a distance between reflecting surfaces is set to be constant. In contrast to the present claimed invention, Hall does not teach or suggest that the refractive index of air is considered in the distance between the parallel flat surfaces of the first parallel member and the transparent member as well as the thermal expansion coefficient of each of the members are set so that the distance between reflecting surfaces is made greater as the temperature rises.

In contrast to the prior art, in the air gap type etalon of the present invention an air gap is formed between the flat surface of the first parallel member and the flat surface of the transparent member facing each other. The distance between the parallel flat surfaces and the expansion coefficient of each of the first and second parallel members are set based on a variation of an air refractive index due to a temperature fluctuation. When a temperature rises, a distance between the surfaces of the first parallel member and the transparent member that face each other, is set to be longer than an initial value before the temperature rises. This enables the compensation of wavelength temperature dependency of a wavelength characteristic of incident light.

Referring specifically to claim 1, it is submitted that the prior art does teach or suggest:

> wherein a Fabry-Perot interferometer is formed based on an airgap positioned between the flat surface of said first parallel member and the flat surface of said transparent member facing each other, and wherein a distance between the parallel flat surfaces and the expansion coefficient of each of said first and second parallel members, are set based on a variation of an air refractive index in the airgap due to a temperature fluctuation, so that when a temperature rises, a distance between the surfaces of said first parallel member and said transparent member that face each other, is set to be longer than an initial value before the temperature rises, to enable the compensation of a wavelength

temperature dependency of a wavelength characteristic of incident light.

Therefore, it is submitted that claim 1 patentably distinguishes over the prior art.

Claims 3-4 and 7 depend from claim 1 and include all of the features of claim 1 plus additional features which are not taught or suggested by the prior art. Therefore, it is submitted that claims 3-4 and 7 patentably distinguish over the prior art.

Referring to claim 14 it is submitted that the prior art does not teach or suggest:

the distance between the parallel surfaces and the expansion coefficient of each of said first and second parallel members being set based on a variation of an air refractive index in the airgap due to a temperature fluctuation, so that when a temperature rises, a distance between the surfaces of said first parallel member and said transparent member that face each other, is set to be longer than an initial value before the temperature rises, to enable compensation for a wavelength temperature dependency of a wavelength characteristic of incident light.

Therefore, it is submitted that claim 14 patentably distinguishes over the prior art.

Rejection of Claim 2

In items 20-24 on pages 7-8 of the Office Action the Examiner has rejected claim 2 under 35 U.S.C. § 103 as unpatentable over the Hall patent in view of the Shirasaki publication and further in view of U.S. Patent 5,982,488 to Shirasaki.

Claim 2 depends from claim 1 and includes all of the features of that claim, plus additional features which are not taught or suggested by the prior art. Therefore, it is submitted that claim 2 patentably distinguishes over the prior art.

Summary

It is submitted that none of the references either taken alone or in combination, teach the present claimed invention. Thus, claims 1-4, 7 and 14 are deemed to be in condition for allowance. Reconsideration of the claims and an early notice of allowance are earnestly solicited.

Respectfully submitted,

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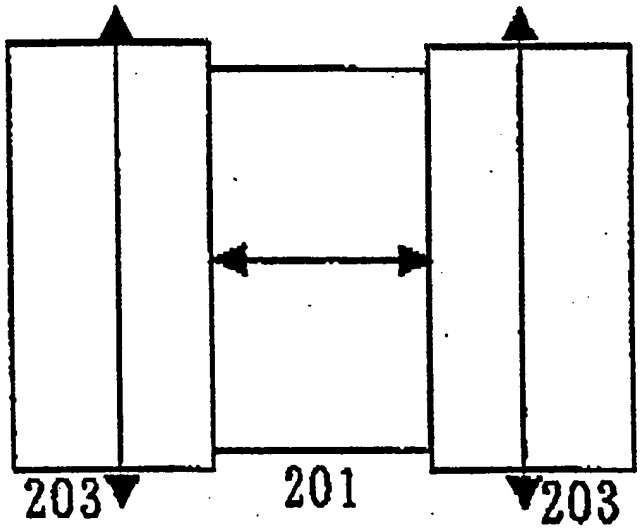
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